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Procedia Engineering 2 (2010) 1

Procedia Engineering

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Fatigue 2010

Fatigue 2010 Foreword

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Received 10 March 2010; revised 14 March 2010; accepted 15 March 2010

Fatigue and consequent failure of materials and structures is a phenomenon known and systematically studied for more than 150 years. Its occurrence is related to the response of materials subjected to cyclic external forces. This is the case of practically all engineering structures. Long-term and still running systematic empirical research has resulted in a great deal of useful data on the influence of stress distribution, geometry of loaded bodies, frequency of cyclic loading, environment, surface finish etc. on the fatigue resistance. All these data are helping considerably in practical designing against fatigue. Later started research of the nature of the fatigue process on a microscopic level has brought a great deal of basic understanding on the irreversible changes in material due to mechanical cycling leading to fatigue and fracture. At present, these two lines of fatigue research are running in a parallel way in many laboratories and institutions. This makes it possible to meet the steadily growing demands on the performance of increasingly sophisticated machines and structures operating under higher cyclic stresses, higher temperatures, more severe environment etc. while keeping the desired degree of reliability and durability. In spite of the substantial progress in research, fatigue failures of engineering materials and structures still occur all over the world. Fatigue can be justly called a permanent problem needing continuous research and engineering attention.

FATIGUE 2010 is the 10th meeting of the International Fatigue Congress. The first meeting of this series was held in 1981 in Stockholm (Sweden). Then followed meetings in Birmingham (U.K., 1984), Charlottesville (U.S.A., 1987), Honolulu (Hawaii, U.S.A., organized by Japan, 1990), Montreal (Canada, 1993), Berlin (Germany, 1996), Beijing (P.R. China, 1999), Stockholm (Sweden, 1992) and Atlanta (U.S.A., 1996). During FATIGUE 2006 in Atlanta the International Steering Committee decided to hold the FATIGUE 2010 in Prague, Czech Republic.

This issue of Procedia Engineering contains full text of papers presented at the FATIGUE 2010. They encompass the whole field of fatigue beginning from the dislocation processes and ending with solution of real engineering issues. For the first time in the history of the International Fatigue Congress the Proceedings are published in an electronic way. There is a free access to the Proceedings via Science Direct since the beginning of the meeting. This new style of publication of papers enables their fast, broad and free worldwide dissemination. We believe that this will essentially increase the impact of the Congress on the research community dealing with the phenomenon of fatigue of materials and structures.

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Brno, Czech Republic
March 2010

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doi:10.1016/j.proeng.2010.03.002